



(43) International Publication Date
19 September 2013 (19.09.2013)

- (51) International Patent Classification:
F24J 2/38 (2014.01) *G01S 3/786* (2006.01)
- (21) International Application Number:
PCT/IB2013/000487
- (22) International Filing Date:
5 March 2013 (05.03.2013)
- (25) Filing Language: Italian
- (26) Publication Language: English
- (30) Priority Data:
MI2012A000409 16 March 2012 (16.03.2012) IT
- (71) Applicant: RICERCA SUL SISTEMA ENERGETICO
- RSE S.P.A. [IT/IT]; Via Rubattino, 54, I-20134 Milano
(IT).
- (72) Inventors: MINUTO, Alessandro; Via A. Genocchi 53, I-
29121 Piacenza (IT). TIMO', Gianluca; Via G. Manfredi
25, I-29122 Piacenza (IT).
- (74) Agents: MARTEGANI, Franco et al.; Franco Martegani
S.r.l., Via Carlo Alberto, 41, I-20900 Monza (IT).

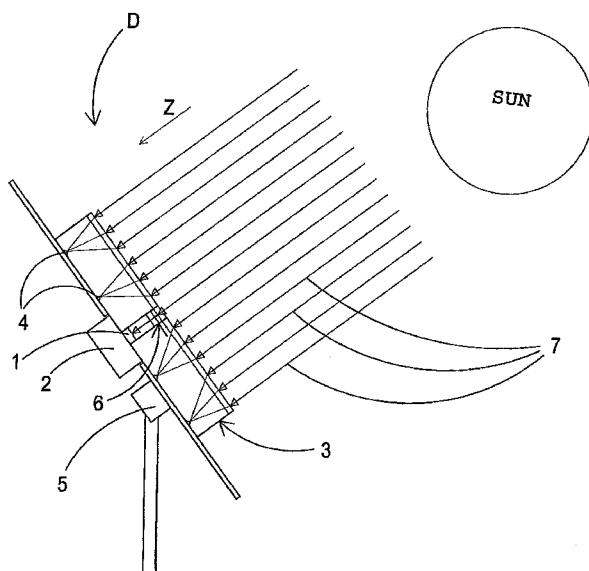
(81) Designated States (unless otherwise indicated, for every
kind of national protection available): AE, AG, AL, AM,
AO, AT, AU, AZ, BA, BB, BG, BH, BN, BR, BW, BY,
BZ, CA, CH, CL, CN, CO, CR, CU, CZ, DE, DK, DM,
DO, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, GT,
HN, HR, HU, ID, IL, IN, IS, JP, KE, KG, KM, KN, KP,
KR, KZ, LA, LC, LK, LR, LS, LT, LU, LY, MA, MD,
ME, MG, MK, MN, MW, MX, MY, MZ, NA, NG, NI,
NO, NZ, OM, PA, PE, PG, PH, PL, PT, QA, RO, RS, RU,
RW, SC, SD, SE, SG, SK, SL, SM, ST, SV, SY, TH, TJ,
TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, ZA,
ZM, ZW.

(84) Designated States (unless otherwise indicated, for every
kind of regional protection available): ARIPO (BW, GH,
GM, KE, LR, LS, MW, MZ, NA, RW, SD, SL, SZ, TZ,
UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, RU, TJ,
TM), European (AL, AT, BE, BG, CH, CY, CZ, DE, DK,
EE, ES, FI, FR, GB, GR, HR, HU, IE, IS, IT, LT, LU, LV,
MC, MK, MT, NL, NO, PL, PT, RO, RS, SE, SI, SK, SM,
TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW,
ML, MR, NE, SN, TD, TG).

[Continued on next page]

(54) Title: DEVICE FOR MEASURING AND CONTROLLING THE ALIGNMENT OF SOLAR RAYS INCIDENT ON A PHOTOVOLTAIC MODULE

Fig. 1



(57) Abstract: A device (D) for measuring the irradiance incident on the plane of the photovoltaic module (3) and for controlling the alignment of solar rays (7) incident on said photovoltaic module (3), comprises tracking sensors (1) of the CCD type, said sensors (1) being integrated in the structure of said photovoltaic module (3), optical collimators (6) suitable for the passage of said solar rays (7) in order to define a light spot (10) which is captured by said sensors (1), and electronic means (2) suitable for acquiring information from said sensors (1), calculating the angular alignment of said solar rays (7) with respect to a normal to the plane of said photovoltaic module (3), controlling the movement and rotation means (M, SM) of the solar tracker (5) in order to guarantee the correct tracking of the module (3) with respect to the solar rays, calculating the solar irradiance incident on the plane of said module (3) and transmitting the data calculated according to a suitable communication protocol on BUS RS485 towards external devices (computers or possible external controllers).

**Published:****(88) Date of publication of the international search report:**

6 February 2014

- *with international search report (Art. 21(3))*
- *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments (Rule 48.2(h))*

INTERNATIONAL SEARCH REPORT

International application No
PCT/IB2013/000487

A. CLASSIFICATION OF SUBJECT MATTER
INV. F24J2/38 G01S3/786
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
F24J G01S

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	WO 2011/154872 A1 (VINCENZI DONATO [IT]; OCCHIALI MASSIMILIANO [IT]; BARICORDI STEFANO [I] 15 December 2011 (2011-12-15) the whole document	1-7
X	DE 10 2008 043133 A1 (COMPOUND SOLAR TECHNOLOGY CO L [TW]) 29 April 2010 (2010-04-29) the whole document	1-7



Further documents are listed in the continuation of Box C.



See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search

14 November 2013

Date of mailing of the international search report

22/11/2013

Name and mailing address of the ISA/

European Patent Office, P.B. 5818 Patentlaan 2
NL - 2280 HV Rijswijk
Tel. (+31-70) 340-2040,
Fax: (+31-70) 340-3016

Authorized officer

Rosello Garcia, M

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No

PCT/IB2013/000487

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
WO 2011154872 A1	15-12-2011	EP 2580560 A1	17-04-2013
		US 2013135465 A1	30-05-2013
		WO 2011154872 A1	15-12-2011

DE 102008043133 A1	29-04-2010	NONE	
